Preparing for EPA's ENERGY STAR Metric Updates

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Agenda

- Overview of EPA's ENERGY STAR Metric Updates

- Insights from EPA's Data Analysis

- Preview of 1-100 ENERGY STAR Score Changes

- Preparing for the Updates

What's getting updated?

- 1-100 ENERGY STAR score models (based on CBECS 2012)
    - Offices
    - K-12 Schools
    - Retail/Supermarkets
    - Hotels
    - Warehouses
    - Houses of Worship

- National source energy factor
- Data center benchmarking options

Why are we updating metrics?

- We're in the *market transformation* business ….when the market moves, ENERGY STAR raises the bar.

- EPA is committed to providing information about building performance based on the most up-to-date market data available.

- EPA's basic approach is **not** changing
  - Provide a national level benchmark
  - Use source energy to provide equitable scores for all fuel mixes
  - Incorporate variables that capture weather and business activity
  - Exclude from analysis terms about technology, in order to reward technology that saves energy

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Schedule for metric updates

- **Perform detailed analysis** (~18 mo.)
  - Started May 2016
  - Hundreds of regression model formulations
  - Explore new variables captured by CBECS
  - Compare CBECS and Portfolio Manager Data
  - Determine appropriate changes to regression models used for score calculations

- **Program metric updates into Portfolio Manager** (~6 mo.)
  - Ongoing
  - Document software requirements
  - Program code changes to the tool and perform extensive testing

- **Release updated metrics in Portfolio Manager**
  - → *Target release is August 2018*

Future updates to note

- Currently conducting national surveys of US hospitals and medical office buildings

- Efforts supported by industry partners

- Based on the results, we hope to update ENERGY STAR scores for hospitals and medical office buildings, *likely in 2019*

- If survey data is sufficient, we hope to reinstate ENERGY STAR certification for medical office buildings
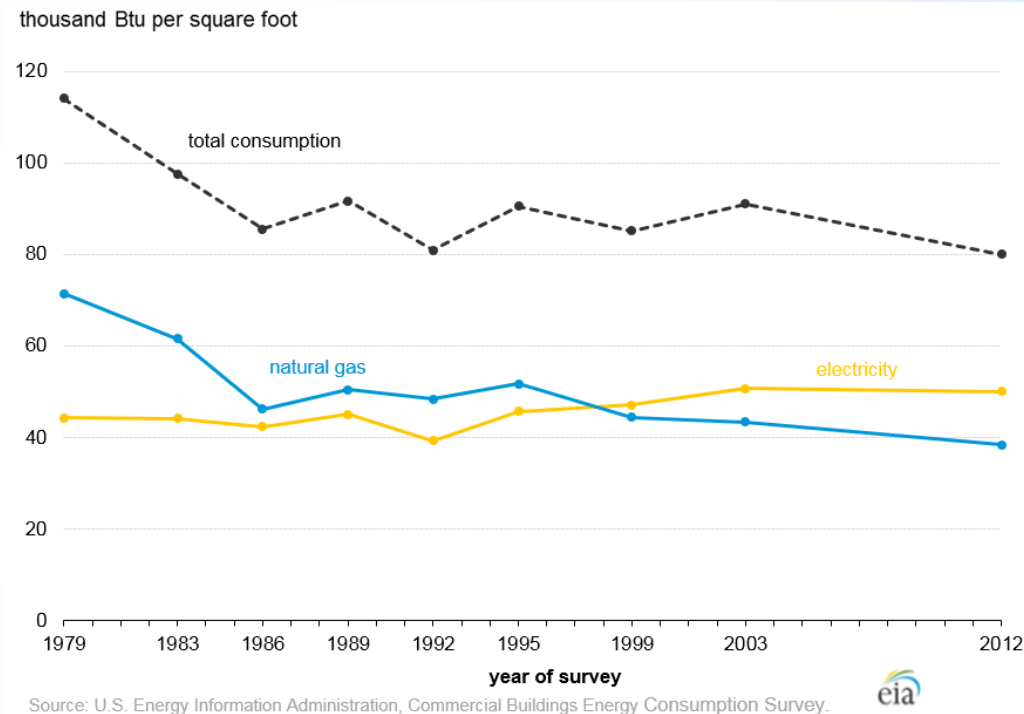

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Impact on historical scores

- When we update the methodology the new calculations will be applied to all time periods

- You will maintain the ability to compare performance over time

  - Even if your scores go down, you will still see your improvement between the baseline and the current periods

  - Continue to analyze differences that are a result of your own activities, not EPA's methodology

Metrics Summary

Metric	Dec 2014 (Energy Baseline)	Mar 2017 (Energy Current)	Change
ENERGY STAR Score (1-100)	39	48	9.00 (23.10%)
Source EUI (kBtu/ft²)	294.9	264.4	-30.50 (-10.30%)
Site EUI (kBtu/ft²)	118.7	95.8	-22.90 (-19.30%)
Energy Cost ($)	581,581.78	540,588.06	-40993.72 (-7.00%)
Total GHG Emissions Intensity (kgCO2e/ft²)	11.3	9.9	-1.40 (-12.40%)
Water Use (All Water Sources) (kgal)	3,373.9	3,228.1	-145.80 (-4.30%)
Total Waste (Disposed and Diverted) (Tons)	879.99	836.75	-43.24 (-4.90%)

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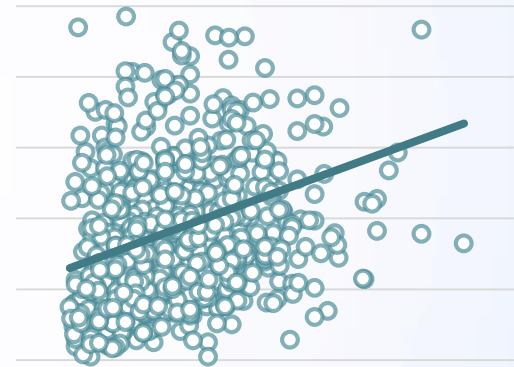# Overall trend in US building energy use

- Long term trend has been relatively stable over the last 30 years.

- 2012 survey shows lower aggregate intensity as compared with 2003.

- This is a *good* trend! It also means that ENERGY STAR scores will shift.

thousand Btu per square foot

total consumption

natural gas

electricity

year of survey

1979   1983   1986   1989   1992   1995   1999   2003   2012

Source: U.S. Energy Information Administration, Commercial Buildings Energy Consumption Survey.

eia

Building blocks of the 1 – 100 ENERGY STAR score

Nationally representative survey data

Regression Modeling

CBECS is the data source for most property types' ENERGY STAR score

Bank Branch

Barracks*

Courthouses

Data Centers

Distribution Centers

Financial Offices

Hospitals

Hotels

K-12 Schools

Office Buildings

Medical Offices*

Multifamily Housing

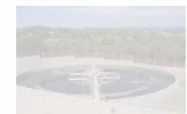Residence Hall/Dormitory*

Retail Stores

Senior Care Communities

Supermarkets

Warehouses

Wastewater Treatment Plants*

Wholesale club/ Supercenters

Worship Facilities

Score based on CBECS data

2012 Commercial Buildings Energy Consumption Survey

- **New and improved data**
- Nationally representative survey of U.S. commercial buildings
- Collects energy usage data and building characteristics
- Published in 2016 by the DOE's Energy Information Administration (EIA)
  - More current data than 2003 CBECS used for current score
- Larger sample
  - 29% larger than 2003 (6,720 vs. 5,215 records)
- More buildings and bigger buildings in the U.S.
  - 14% increase in the total number of buildings
  - 22% increase in total building floor space

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ENERGY STAR score development

- **Analyze national survey data**
  - CBECS (Portfolio Manager Data is NOT used as an input)

- **Develop regression models**
  - Predict the average energy use for a building that operates just like yours (normalized mean)

- **Compare your building's actual energy use with normalized mean**
  - Actual < Normalized Mean → More efficient

- **Assign ENERGY STAR Score with a lookup table**
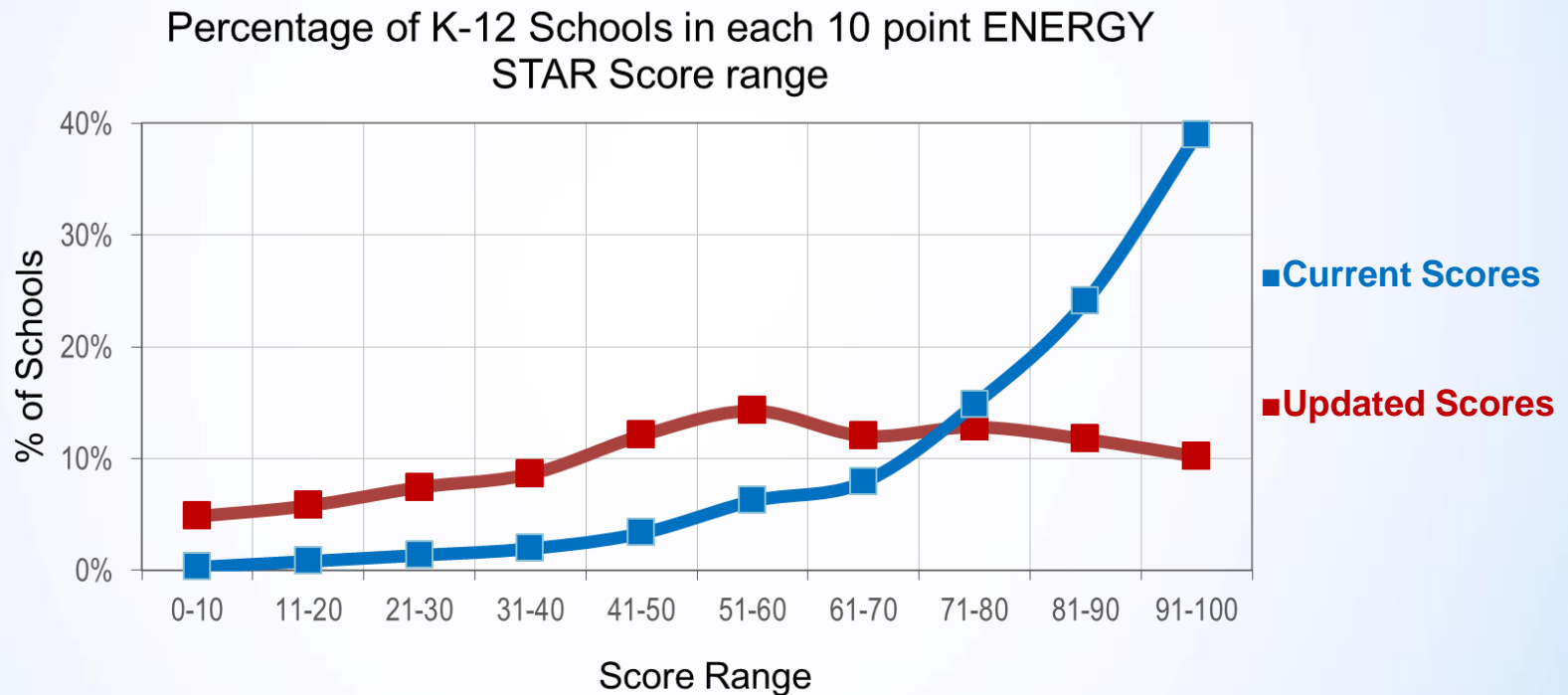 - Lower ratio of actual EUI vs normalized mean results in higher ENERGY STAR Score

Expected Change to Average ENERGY STAR Scores
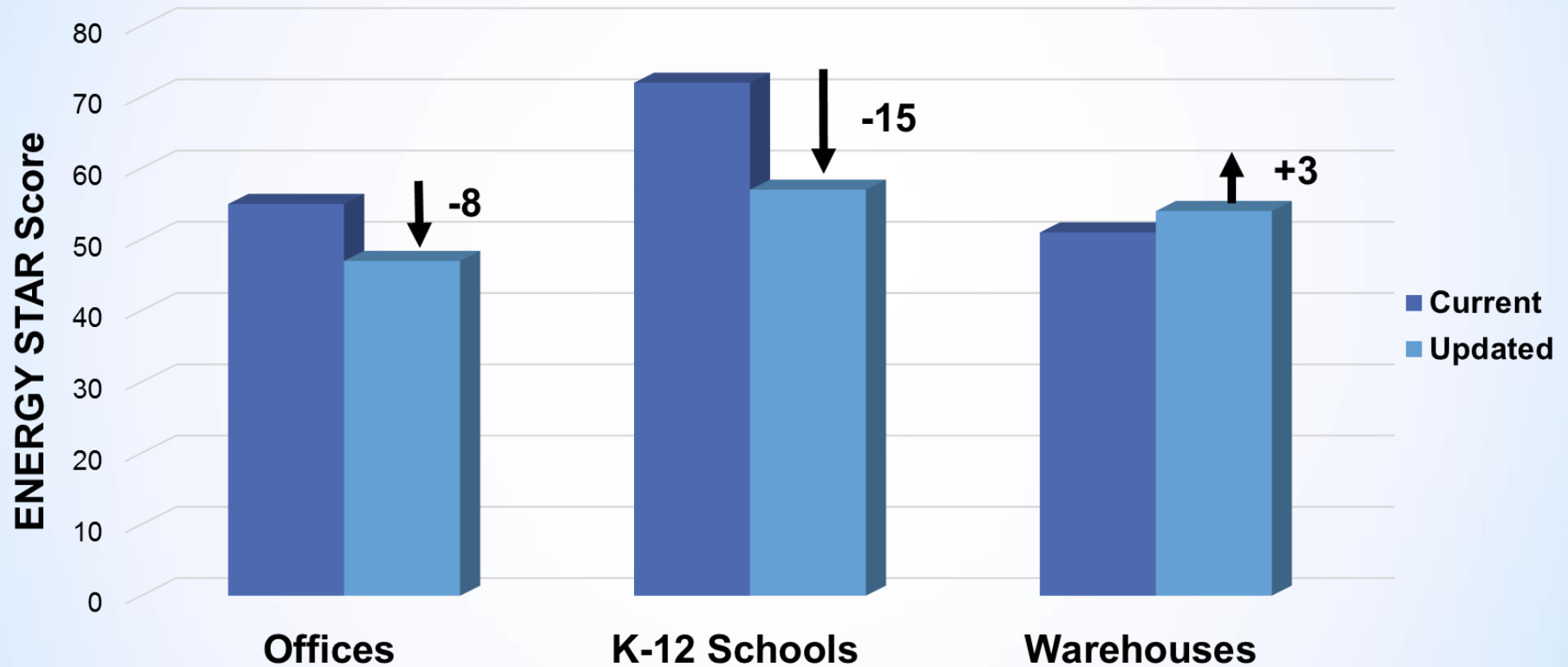
Expected Change to Average ENERGY STAR Scores
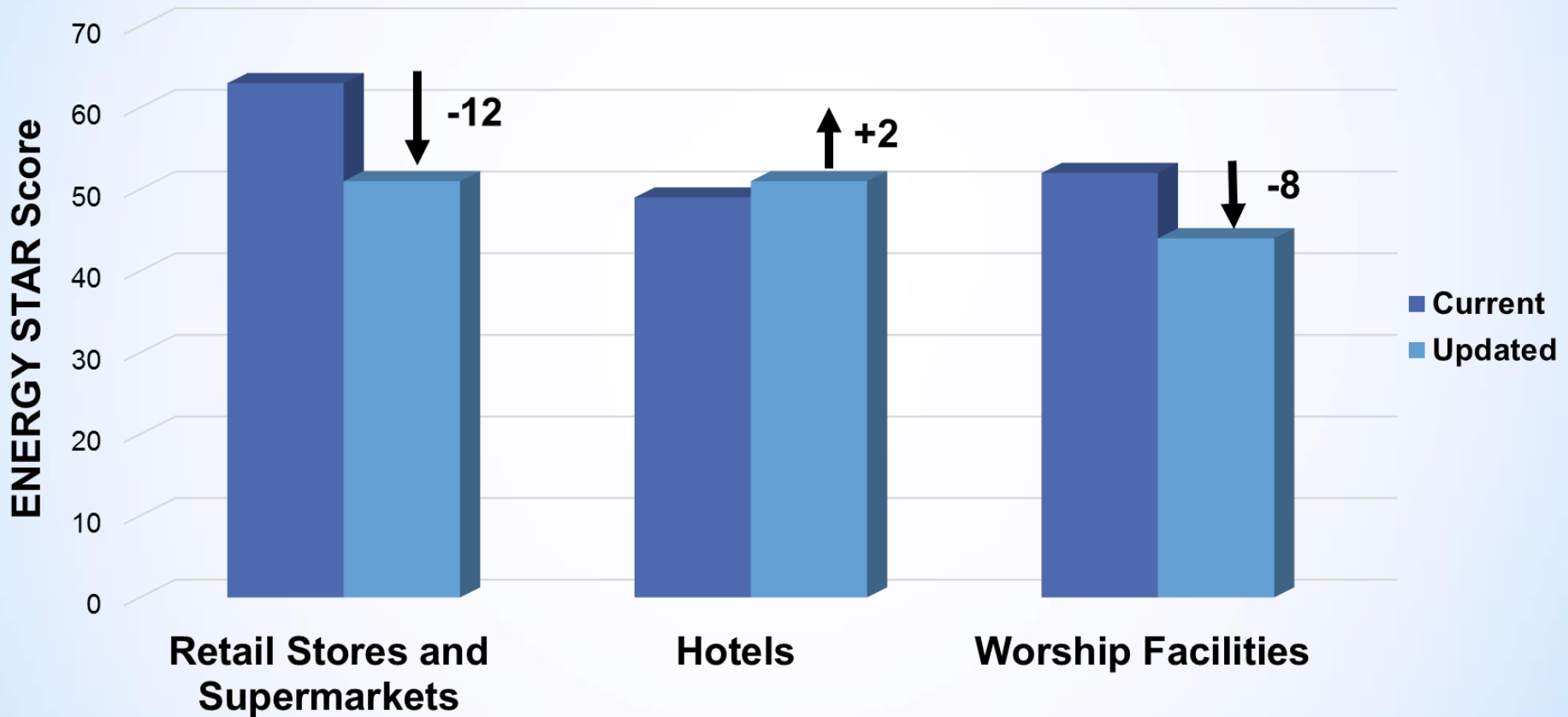
ENERGY STAR scores need to be recalibrated over time

Percentage of K-12 Schools in each 10 point ENERGY STAR Score range

Retail Store and Supermarket

- Too few Supermarket observations (48) in CBECS 2012 to support an ENERGY STAR Score

- Retail Store and Supermarket CBECS data pooled together to create a sufficiently large dataset

- One regression model supports both property types
  - Extensive analysis to ensure equitability for both property types
  - Accounts for different –
    - Average energy use of supermarkets
    - Impact of number workers on energy use in supermarkets.

- Change will be transparent to Portfolio Manager users

Data Center energy estimates

Two options for properties with data centers

1. Existing and Recommended Option
   - Measure and enter IT energy
   - Industry best practice – Most accurate and complete measure

2. New Option: Estimated Energy Use for Data Centers
   - Coming in August 2018
   - Designed for smaller data centers, within another property type, and where it is not practical to measure IT Energy
   - Data center energy estimate = 2,000 kBtu/ft^2 x Data Center Area (sqft)
   - Subtracted from the buildings actual energy use before calculating a score
   - Adjustment is capped at 10% of the building area

Update to Source Energy Factor

- Source energy traces the heat and electricity requirements of the building back to the raw fuel input

  - Level playing field for different fuel types

- Portfolio Manager delivers several key performance indicators in Source Energy,

  - Weather normalized source EUI.

  - ENERGY STAR score

- Incorporates all types of electric generation: Coal, Gas, Wind, Hydro, etc…

Site Energy results in Building B appearing more efficient. Source Energy provides an equitable comparison.

Site Energy: 118
Source Energy: 124

Site Energy: 100
Source Energy: 120

A   =   B

Steam generated by a natural gas boiler on-site

Equivalent Heat Load

Steam purchased from a utility off-site

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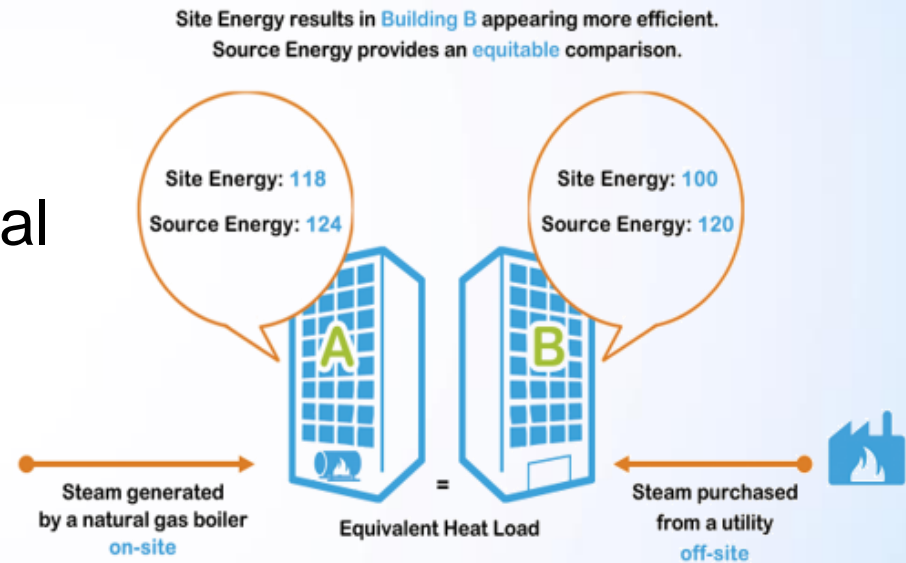
Electric Source Factor: Grid electricity from renewable energy

- **Past approach**
  - EIA publications treat renewable energy as equivalent to fossil fuel energy

- **New approach**
  - Renewable energy sources are not subject to generation losses at the power plant, like fossil fuel (no combustion)

- **New electric source factor releasing Aug 2018**
  - Dropping from 3.1 to 2.8 (more efficient grid)
  - Will impact ENERGY STAR score & all source energy metrics
  - ENERGY STAR score could increase or decrease depending on a building's fuel-mix ratio
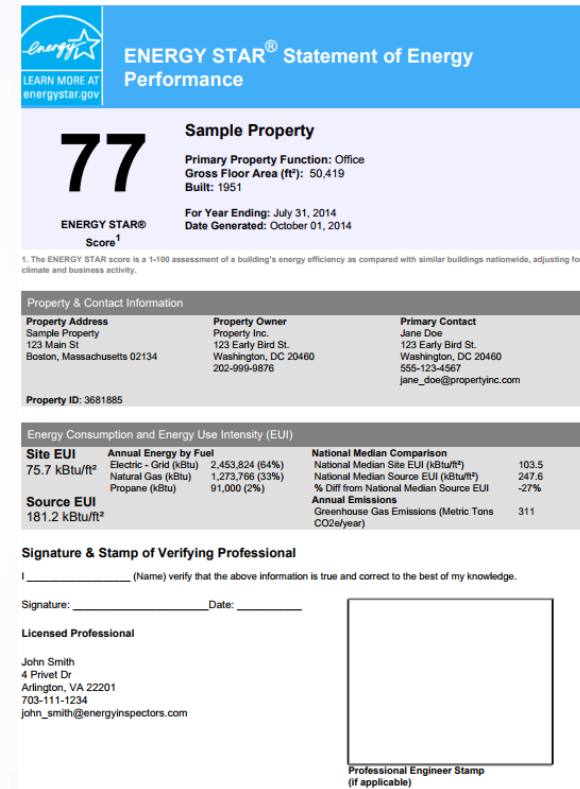
Preparing for the Updates

- Apply for ENERGY STAR certification before August 2018 …especially if your score is close to 75!

  - If you've already earned 2017 certification, your next eligible period will be 11 months after the "Year Ending" date from your previous application.
  - If the "Year Ending Date" for your 2017 certification was between July and December of 2017, you are allowed to apply early – *in July 2018*.

- EPA will <u>not</u> rescind prior ENERGY STAR certifications

  - All of your certified properties will still be on our registry
  - If you have top performers that are not certified, now is a good time to pursue certification

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Preparing for the Updates

- Communicate the metric updates – to colleagues, clients, stakeholders, etc.

- If needed, document pre-update metrics with Portfolio Manager reports
  - "Performance Highlight" Report (Portfolio level, multi-year)
  - Statement of Energy Performances (Building level, represents 12 month performance period)

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Preparing for the Updates

- Document ENERGY STAR pre-update scores for other third party certification and incentives

- Get ready for the upcoming data center flexibility and possible new required inputs for the ENERGY STAR score

- Tune in to EPA announcements and check out www.energystar.gov/scoreupdates to stay up-to-date.

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How EPA is Preparing

- Conducting general outreach and sector-specific webinars, ongoing since 2014

- Coordinating with local and state benchmarking policy implementers

- Briefing organizations that offer incentives, recognition, and third party certifications based on ENERGY STAR metrics

- Preparing additional materials for ENERGY STAR partners, including associations, so we can broadly share consistent information leading up to August 2018

Questions and discussion

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